NATIONAL STEEL AND SHIPBUILDING COMPANY

LEAPFROG TECHNOLOGY TO STANDARDIZE EQUIPMENT AND SYSTEM INSTALLATIONS

UNIVERSITY OF NEW ORLEANS SUBCONTRACT

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SECTION NO. 1 — LITERATURE SEARCH AND BENCHMARKING

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1.A LITERATURE SEARCH AND BENCHMARKING RELATED TO EQUIPMENT INSTALLATIONS

This sub-task report provides a description of the literature search, information collating, and benchmarking performed. Under this task, information and data pertaining to Equipment Installations and Foundations were collected and reviewed. The information collected and reviewed includes the following :

- The existing standards/guidelines for equipment installations of various shipyards
- Rules and guidelines of USCG and ABS
- SSC Reports
- Annual Book of ASTM Standards — Shipbuilding Vol. 01.07
- NAVSEA and Navy General Specification Documents
- Military Standards
- NSRP — Foundation Design Manual
- Foundation Standards for Sealift Ships
- NASSCO's in-house databases, reports, and documents
- Vibtech's in-house databases, reports, and documents

The materials collected were reviewed for relevant information applicable to the current project. We evaluated the relevant specifications and existing standards, guidelines, and practices from ship building and other industries. The information was categorized and benchmarked by foundation types and functionality.

NASSCO's and Vibtech's in house libraries were thoroughly researched for relevant standards and related information.

These in house libraries produced among others:

- Studs, Spool, and Grillages Analysis for Sealift ships
- PF 109 Class Foundation Design Guide
- Designers Handbook for Foundations, Ingalls Shipbuilding
- Producibility of Foundations, Bath Iron Works
- Foundation Practices Manual, Saint John Shipbuilding
- Foundation Control Plan AOE Class for NASSCO

These standards were extensively reviewed and then collated to accomplish benchmarking. Vender information was also collected and identified from the libraries. This information kept us abreast of new materials and techniques available in commercial form during benchmarking.

1.B LITERATURE SEARCH AND BENCHMARKING RELATED TO DISTRIBUTIVE SYSTEM INSTALLATIONS

This sub-task report provides a description of the literature search, information collating and benchmarking performed. Under this task, information and data pertaining to Distributive System installations was collected and reviewed. The information collected and reviewed includes the following:

- The existing standards/guidelines for system installations of various shipyards
- Rules and guidelines of USCG and ABS
- SSC Reports
- Annual Book of ASTM Standards — Shipbuilding Vol. 01.07
- NAVSEA and Navy General Specification Documents
- Military Standards
- NASSCO's in-house databases, reports and documents
- Vibtech's in-house databases, reports and documents

The process of collecting information pertaining to system installations used in shipbuilding industry as well as other industries is completed. The information has been benchmarked to other standards and collated into a usable form.

Standards have been received from:

- Avondale Shipyard Division
- Kawasaki Heavy Industries, LTD
- National Steel and Shipbuilding Company
- American Society for Testing and Materials (ASTM)
- Saint John Shipbuilding Limited

NASSCO's and Vibtech's in house libraries were thoroughly researched for relevant standards and related information. These in house libraries produced among others:

- Studs, Spool, and Grillages Analysis for Sealift ships
- Pipe Hangers and Cable Hangers Producible Designs
- Medium Weight Testing of Various Stud Weld Attachments
- Analysis of Pipe Hangers for St. John Shipbuilding Ltd.
- Analysis of Spiral Duct Hangers for NASSCO

These standards were extensively reviewed and then collated to accomplish benchmarking. Portions of standards and documents were copied and placed in binders to group like standards in a convenient manner. All of the piping, electrical, and HVAC standards were grouped into individual binders, allowing direct comparisons and ease of reference for the remainder of the work scope. The information/standards arranged by system functionality were further sub-grouped by type, geometry, and fabrication details.

Review of these standards along with shipyard tours to witness first-hand how they apply their particular standards was undertaken. Viewing how standards are applied at the various yards gave us tremendous insite on what should be applied and when, depending on the yard facilities. This benchmarking and compiling of relevant documentation gives us a baseline to proceed with the remainder of the project.